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SELECTED CONVENTION PAPERS

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A DYNAMIC CURRICULUM FOR TEACHERS OF THE VISUALLY HANDICAPPED

by

Evelyn J. Rex

Webster defines dynamic as "pertaining to change," "forceful," or "opposed to static." The curriculum of persons preparing to work with visually handicapped children should adhere to all aspects of the definition.

The area of the visually handicapped has not been a static one. Recent years have brought considerable change, both in visually handicapped children and in the programs which serve them. If a curriculum is to be a dynamic one, it must show cognizance of these changes. It must change to meet changing needs.

Areas of Change and Need in Education for Visually Handicapped

It seems to me that there are four major areas of change and need which must be emphasized.

First, we have changed in the way in which we group visually handicapped children. We have moved from thinking of them as dichotomous groups of the blind and partially seeing to viewing them as one group, the visually handicapped. We have changed our definitions by adding a functional definition to the clinical one so long used. As we have changed in our thinking, the placement of children and the types of programs established have changed. Recent studies by Jones (1965, 1966) indicate a trend toward combination units which serve both blind and partially seeing children.

Second, visually handicapped children make greater use of their residual vision. The change related to this area has come about not so much through a change in children as through a teacher's changed point of view which encouraged use of residual vision. Increased use of low vision aids had added further encouragement. Studies by Barraga (1964), Ashcroft, Halliday and Barraga (1965), and Holmes (1967) have given direction to this changing area.

Third, the area of the visually handicapped shows increased concern for the child whose handicap is now described as a learning disability. Such a learning disability may be related to the visual process but can be attributed to a perceptual or cognitive disability rather than a sensory disability. The Bateman study (1962) is an indication that such children have been placed in classes for the visually handicapped in the past. Some are still in such classes. The literature reveals little of how the child with a learning disability related to vision is cared for in programs for the visually handicapped. One would suspect that the more sophisticated diagnostic and teaching techniques are being carried out by persons trained in the area of learning disabilities rather than in the area of the visually handicapped.

Finally, there are increasing numbers of visually handicapped who have additional handicaps. With some the multiply handicapping conditions are

extreme, with others they are less. Change has taken place in the programs which serve multiply handicapped children. The residential schools have assumed leadership roles in establishing programs, often for the most severely involved. Programs designed specifically for the less involved are less well developed, particularly in the day school programs. However, some school districts are already planning and setting up programs for such children. Most are special classrooms for children who cannot be integrated into regular classes but who can function in a school program and who can live at home.

Role of the Teacher

With emphasis in these four areas there must be change in the role or function of the teacher of the visually handicapped.

Bowers (1963) indicated a need "to define more clearly the roles and functions of teachers and to develop the kinds of programs which will likely produce teachers capable of functioning well in a variety of settings (p. 385)."

In this statement lies the crux of the issue of a dynamic curriculum for teachers of the visually handicapped. What will be the roles and functions of such teachers?

Some teachers of the visually handicapped will fill roles in the residential schools. Others will fill roles in day school programs, in a variety of types of programs. Some will teach in programs which are not related to an educational organization but to a welfare, rehabilitation, or other type of organization.

Some teachers of the visually handicapped will teach children of preschool age. Others will teach children of high school age.

Teachers of the visually handicapped will be working with both blind and partially seeing. They should be equally prepared to work with the child who is educationally blind and the child with partial vision. Their preparation should not place emphasis on one area to the neglect of the other.

Teachers of the visually handicapped will assume a new role in working with children of low vision. In the past we have prepared the teacher to work with the child who uses braille or the child who uses large print. We have not placed sufficient emphasis on those who lie somewhere between the two groups. We have not emphasized the training of low vision. Research has shown us the effectiveness of such training and the tools to implement it. A major responsibility belongs to the universities to transmit this knowledge to future teachers and to provide the opportunity to put the knowledge into practice.

Teachers of the visually handicapped today find themselves responsible for children with learning disabilities of various types. One would expect a specialist in the area of vision to be especially knowledgable concerning a learning disability related to vision. However, if the teacher's preparation has stressed lack of vision, the opposite may be true. The teacher of the visually handicapped must be prepared as a specialist in vision with the ability to work with the child who lacks some or all of his vision and with the child who has vision but lacks the perceptive or cognitive ability to use it. Curricula of teachers of the visually handicapped must place some emphasis on teaching the child who falls into the latter category.

Increasing numbers of teachers find themselves working with children who

have a handicap in addition to blindness. What knowledge do teachers have of other handicaps? What knowledge do they have of the educational adaptations which are necessitated by the handicap and by the combination of the handicap and visual impairment? Some of this knowledge must be made available in the future teachers' university preparation.

It is impossible to enumerate, even to anticipate, the many other facets of the role of the teacher of the visually handicapped. It is almost as impossible to fully prepare the teacher of the visually handicapped for the many facets of the role. A dynamic curriculum is needed.

Changes in Special Education

The comments made thus far have been concerned with needs and changes specific to the area of the visually handicapped. We cannot ignore needs and changes within the general area of special education.

The role of the special educator is changing. The role is rapidly becoming one of diagnostician and tactician (Schwartz, 1967) encompassing the broad area of special education. Such a person thinks less in terms of medical categories and more in terms of educational categories. Such a person needs preparation with a more generic base, a core curriculum of special education. Such a curriculum should be a dynamic one for teachers of the visually handicapped.

It has been said that there is nothing new under the sun. A generic approach or a core curriculum has long been advocated for teachers of the visually handicapped. In 1961 participants at a workshop sponsored by the American Foundation for the Blind (AFB, 1961) established three areas of requirements in the preparation of teachers of the visually handicapped. They are as follows:

Area I: An introduction designed for an overall orientation to the fields of exceptionality

Area II: Preparation in curriculum, methods and guidance in relation to the larger program for the entire field of exceptional children, with provisions within the courses for specific application to the teaching of blind and visually handicapped

Area III: The special skills requisite to the field of the blind and visually handicapped.

Professional standards established by the Council for Exceptional Children in 1966 is in agreement with the AFB requirements.

Most universities preparing teachers of the visually handicapped have incorporated Areas I and II in the curriculum. Most of these curricula could take a more generic or core approach if emphasis and direction of Area II were changed somewhat. Most curricula satisfy the requirement "in relation to the larger program for the entire field of exceptional children" by providing one or two survey type courses and parallel courses in the various areas of exceptionality. If emphasis were placed on the work "within" as suggested, the curricula would include many integrated courses within the area of special education. Such courses would provide the teacher of the visually handicapped with the needed knowledge to work with children with additional handicaps and with learning disabilities.

The Special Education faculty at Illinois State University is presently working on a curriculum based on a core approach. The curriculum in Table 1 proposed for the area of the visually handicapped incorporates the suggestions and thinking of the staff. Except for the special courses in the area of the visually handicapped it is a curriculum which could be offered to all future teachers of exceptional children. Specific skills necessary to teachers of the visually handicapped are added to the basic core curriculum.

Table 1

A Proposed Curriculum for a Five Year Program
in the Area of the Visually Handicapped

Illinois State University

I. Communication
   A. Communication Skills
      1. English
      2. Fundamentals of Speech
      3. Speech Correction
      4. Linguistics *
      5. Language Development *

II. Social and Behavioral Sciences
   A. Sociology
      1. Introduction
      2. The Family, Community *
      3. Juvenile Delinquency *
      4. Social Disorders *
   B. Psychology
      1. General Psychology
      2. Normal Child Growth & Development
      3. Abnormal Child Growth & Development (The Exceptional Child)
         a. Physical
         b. Intellectual
         c. Social
         d. Emotional
      4. Normal Cognitive Development *
         a. Motivation
         b. Learning
         c. Perception
         d. Personality
      5. Abnormal Cognitive Development (Psychology of Exceptional Children)
      6. Mental Hygiene
      7. Behavioral Disorders in Children *
      8. Measurement

III. Humanities
   A. Literature and Foreign Language
      1. Foreign Language (Optional)
      2. Literature
   B. Fine Arts
      1. Art Activities for Elementary Schools

(Table continued)

Table 1 (continued)

2. Music Activities for Elementary Schools
3. Art and Music Activities for Exceptional Children

C. History and Philosophy
1. History (General)
2. Historical, Philosophical, and Social Foundations of Education
3. Historical, Philosophical, and Social Foundations of Special Education *

IV. Natural Sciences and Mathematics
A. Biology
1. Functional Anatomy
2. Physical Defects *
3. The Eye
B. Geography
C. Mathematics
1. Basic Concepts of Mathematics

V. Physical Education
A. Activities
B. Physical Education for Exceptional Children

VI. Methodology
A. Elementary Curriculum
B. Curriculum for Exceptional Children *
C. Teaching of Reading
D. Teaching of Mathematics
E. Teaching of Science *
F. Teaching of Social Studies *
G. Teaching of Content Subjects to Exceptional Children *

VII. Visually Handicapped
A. Introduction to the Visually Handicapped
B. Education of the Visually Handicapped
C. Braille
D. Advanced Braille
E. Mobility

VIII. Practicum Experiences
A. Laboratory Reading Methods
B. Analysis, Diagnosis and Remediation of Reading Difficulties *
C. Observation and Participation of Normal Children
D. Observation and Participation of Exceptional Children
E. Student Teaching or Internship

*Indicates courses not presently in curriculum of the visually handicapped.

The proposed curriculum is intended for the undergraduate student. It incorporates the General Education and Professional Education requirements of our university. The additions to the curriculum would be Special Education requirements. Many of the Special Education requirements are taught outside the department. The program is a strong interdisciplinary one and is moving toward greater stress of the behavioral sciences. Perhaps the most challenging aspect of the curriculum to the staff, and hopefully of comparable benefit

to the student, is the opportunity for the staff to work as a team with other members of the department and with members of other departments. For example, as the student takes Child Growth and Development--taught in the Elementary Education Department--he also takes Abnormal Child Growth and Development in which members of the Departments of Special Education, Psychology, Biological Sciences, etc. work as a team.

Eventually the requirements in the special area of the visually handicapped may undergo further change. The present concern, however, is to enhance the curriculum aside from the special area. Changes in the special area will likely come within the content of the courses rather than the courses themselves. For example, greater emphasis in the training of residual vision is planned.

The curriculum is proposed as a five year plan. It is not possible to include all the necessary preparation in a four year program.

Time does not permit greater detail of the proposed curriculum or of the topic. Areas such as proposed practicum experiences are topics deserving of a separate paper.

The proposed curriculum undoubtedly has weaknesses. It is hoped that they are outweighed by the strengths and that it will prove to be a dynamic curriculum for the visually handicapped. If not, we must charge ourselves with further change. We cannot remain static, but must continue to seek a dynamic curriculum.

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ABSTRACT

MULTIPLY IMPAIRED BLIND CHILDREN: A NATIONAL PROBLEM

by

Milton D. Graham

Using a mail questionnaire, data were collected on 8,887 multiply impaired (MI) blind children. Most frequent second condition reported was mental retardation (80 percent of the sample). As expected, reading levels are far below chronological age expectancy.

General implication of the data are that for the estimated 15,000 such children in the US, much better early detection techniques are needed everywhere; better and more frequent physical diagnoses, much more specialized training to promote environmental control, and far better treatment and special educational techniques are needed. This means more and better prepared teachers working with other specialists. Experimental programs have proved that the potentialities of MI blind children are realized when high expectations and highly specialized programs exist. Such programs are costly but rewarding in their results. A national effort is needed to salvage the growing numbers of MI blind children in the country.

COLLEGE PREPARATORY PROGRAM FOR VISUALLY IMPAIRED STUDENTS

by

Walter .. Fitzgibbon

During the five week first summer session of 1967, the Rehabilitation Division of the North Carolina State Commission for the Blind, and Western Carolina University cooperatively presented a college program for visually impaired students. A member of the Commission and a member of the University served as coordinators. The former was responsible for the daily supervision of the program and the latter met responsibilities associated with broad planning, operation, and evaluation.

The purpose of the program was to aid visually impaired students in making the transition from high school to college. An attempt was made to provide, as nearly as possible within a summer term, the realities of campus life for a freshman. Therefore, the students had to meet the academic standards as established for sighted students, and only necessary adaptations, such as the

reading of tests to totally blind students, were to be made. Further, the students had to meet the rules and regulations of the University and to control their own leisure time through the use of university recreational facilities.

The program was considered experimental in avoiding preconceived ideas about the implications of a visual impairment, in trying various ways of solving problems which might arise, and in adapting or adjusting the program as needed.

Participants

The North Carolina Commission for the Blind selected and sponsored 18 students who met their criteria for participation in the program. The students also met the freshman entrance requirements of the University or were expected to be able to remove deficiencies for full admission within a reasonable period of time. Of the 18 students, five were totally blind, four could read with minimal assistance, and nine had travel vision. There were ten females and eight males who ranged in CA from 17 to 23. Scholastic Achievement Test (SAT) scores ranged from 1200 to 474; the verbal scores of the Wechsler Intelligence Scale for Children ranged from 132 to 94.

Fifteen sighted students were employed to function as readers and as upper classmen advisors for three hours a day, five days a week. Weekend services were provided as needed. The aides were permitted to take six quarter hours of courses for credit. Of the aides, two were juniors and the remaining 11 were seniors. While most of the aides were preparing to be teachers, a wide variety of major areas of study were represented.

Four counselors who are faculty members in public schools provided vocational and some personal counseling to the students. They were carefully selected for their maturity from students enrolled in a practicum for counseling.

The Program

The visually impaired students enrolled in a five quarter hour freshman course for credit. The courses included biology, geography, geology, history and English. The students also participated in a two hour per day noncredit group session in which methods of study for visually handicapped students and career planning were emphasized. Consultants from specialized vocational areas provided their services during the activities of the group sessions. Personal and vocational counseling were made available in scheduled and non-scheduled conferences with the counselors.

Evaluation was by means of analysis of subjective data. The data included Logs which the aides maintained, periodical reports of the counselors, personal interview with all professors having a blind student in their classes, taped evaluative conferences, and evaluations of the program by all participants and course instructors. Academic achievement was evaluated through the grades received and through conferences with the students and instructors.

Results and Comments

A complete report of the program will soon be available from the Commission or the University. Some of the findings which may be of interest

are related to physical facilities and mobility, to personal social adjustment, and to academic attainment.

In reference to mobility, there was need for little concern about those with travel vision after they have had a small amount of help for orientation to the campus.

For the totally blind, however, there was evidence of a definite need for more travel training in their precollege programs which should include familiarity with the use of a cane or, perhaps, with other travel devices. In the program being discussed, the totally blind students were able to travel reasonably independently after the fourth day on campus. Much of the travel independence appeared to be due to the amount and intensiveness of the work of the aides. Problems which arose sporadically throughout the program usually involved the students' becoming disoriented as they passed a large open area, such as an entrance to a parking lot. Another frequent problem, especially in the beginning of the program, was the inappropriate use of the cane to go down sets of steps.

There was no accident related to the use of the sidewalks, terrain, or streets. This, perhaps, gains significance when it is placed in the perspective of the University's location in a mountain area. There was, however, an observed undersirable tendency of the students to attempt to cross streets at any convenient place. The need for the use of crosswalks must be impressed upon them.

The concern of sighted persons about the amount of physical care visually impaired persons may require from roommates was existent at the initiation of the program. No incident during the program, however, would support further concern about housing the students. It is believed that the careful orientation to the dormitory which the aides provided did help avoid some problems. The lack of problems in care for the impaired, however, was related to the ability of the students to take care of their own physical needs.

Some of the students had never had experience in a cafeteria and were quite concerned about using it. The problems were resolved by having them request which foods were available and having them ask for more information about unfamiliar food. A sighted person usually carried the tray to the table. With this service, the use of a cafeteria need not be a frightening experience.

The aides were to function in "big brother or sister" type roles in order to help the students make the personal and social adjustments required for college life. Most aides, though, became attached to their students and wanted to make sure that they were successful in college. Some of the students indicated that the aides may have tried to be a bit too helpful and resented being given directions by them. It was observed, however, that some of the students who complained the most, especially those with considerable residual vision, also voluntarily sought the aides and spent up to three hours at a time discussing personal problems.

Most of the personal social problems of the students were mild and similar to those of sighted freshmen in being related to a generalized fear of college life and concern about being socially accepted. There were additional apprehensions which were related to the visual impairment--specifically the students were concerned about being treated as freaks or they were concerned that blindness would detract from their social acceptance. The most numerous problems were found among the partially sighted, especially among the females. In almost every instance, the personal social problems of the partially

sighted were related to the visual impairment--some denied thet they had a visual limitation; others intellectually discussed their visual limitation but appeared to divorce themselves psychologically from the impairment. Other partially sighted students attempted to completely avoid association with the totally blind students.

Primarily as a result of the role of the aides, most of the minor apprehensions about social acceptability were resolved. In some instances the aides apparently helped the partially sighted to more accurately appraise their visual limitations for college life. Further, the relationship between the aides and the students permitted the discovery that several students possessed relatively severe personal problems which most probably will require prolonged and intensive therapy.

All aides agreed at the end of the program that, in their opinion, the students were better adjusted academically, personally, and socially to college life than the average freshman after five weeks on campus. The students indicated that they were pleased to have nonprofessional persons available with whom they could communicate and in whom they could confide. Therefore, it is suggested that much of the favorable adjustment of the students and success of the program may be attributed to the role of the aides.

All but one student passed the course. This amount of academic success is greater than one would expect since there was a considerable spread in the measured intelligence, degree of vision, chronological age, and SAT scores. The success of the students, apparently, was related to the desire of the students to do well. It may also be partially attributed to their being restricted to a five hour course which permitted them adequate time for study. The success of the students in this program as compared to the high dropout rate of sighted students who enter college with a full study load suggests that it might be advisable to permit visually impaired students a lesser study load for their first quarter or semester in college and provide more personal services such as those which were part of this program.

Academically related concerns of the students before the program included apprehension about having male instructors and the amount of work they require of students. In the program, no problems developed which were due to the professors. They cooperated well and made every reasonable attempt to provide adequate instruction for visually impaired persons.

Of course, it is recognized that the probability exists that the students will have professors who do not have empathy for the problems of a visual limitation. Most professors, however, will work with the students. Probably most significant in the student's success in the classroom is his informing the professor of his visual impairment as early in the course as possible. Several students, especially the partially sighted, chose not to and the professors were quite annoyed with them for not doing so.

It is most desirable that visually impaired students know how to use all specialized equipment before they enroll in class. Additionally, it is recommended that each student have, and know how to use, a typewriter. More severely impaired students should also have a tape recorder. With these pieces of equipment and a reader when necessary, visually impaired students have more than a reasonable chance to be successful--without them they are severely handicapped.

The students need to learn how to take notes and how to listed to a reader. With the development of these skills and the use of readers, most

nonlaboratory classroom work is not a major problem. As a general guide, three to four hours of study per course hour of instruction should be sufficient to permit the student to meet most course requirements.

Upon the basis of the success of the program, it will be continued this coming summer and will probably be an annual program. Some changes are being made but the basic purposes will remain the same. Additional attention is being directed to the collection of objective data as an addition to the subjective evaluation.

REHABILITATION AND PREVOCATIONAL PLANNING FOR VISUALLY HANDICAPPED YOUTH

by

Mary K. Bauman

Rehabilitation and prevocational training are often significant factors in the process of growing up, and in their truest meaning they take place over a considerable period of time. Rehabilitation is oriented toward giving the individual independence--not only vocational independence, but to some degree, social and emotional independence, and independence in terms of total management of personal affairs.

Steps in Rehabilitation

Some children begin to learn independence, and therefore take the first step toward carrying the responsiblities of a job and the responsibilities of adult citizenship, quite early. For them "rehabilitation" may appear to be a rather short term process concerned with little more than counseling toward a job choice, perhaps supported by testing and job tryouts, training for that job, and placement in it. Even this can be a fairly long and complex process.

However for many children, and especially for many blind children, steps toward any type of independence come slowly and perhaps painfully. I need not review the too familiar catalogue of reasons why the blind youngster finds independence elusive or even forbidden. We have heard a talk on orientation and mobility as part of the pattern of services intended for the elementary or secondary years, but in fact all of us see many visually handicapped teenagers who have never traveled independently and for whom a very important step in rehabilitation is acquiring travel skills and the freedom to use them wisely.

Another major step basic to rehabilitation for many teenagers is acquiring and accepting a realistic view of themselves, their abilities and their potential. Some families and friends, and at times even teachers, seem to feel that they can compensate for a visual handicap by encouraging the blind child to believe that he has certain special talents. One of the favorite special talent areas is music, but there are others, depending of course upon what the partiuular child seems to like and to do just a little better than others around him. We talk to many students in their teens who firmly state that they expect to have a career in music, or perhaps in foreign languages, or in writing, and assure us that they have special talent in the named area. To our amazement they believe this even when they have less than "A" grades in the subject in school. I talked recently to a boy who unhesitatingly stated that while it was true that he was blind God had given him musical talents especially in the area of composition. He explained that he can sit at his piano and tunes "just

come to me" so that he can sit and play for hours. Unfortunately, he has not learned braille music so, he explained, he cannot write these compositions down. What he does not realize is that most children who have learned anything about playing a piano have his talent, and to the distress of their parents often prefer such improvisation to the piano practice required for real development of musical skill.

The realization that these "talents" are far from special and, still worse, that no one will pay for them is one of the sad but necessary steps in growing up and in rehabilitation, for, until the individual's mind is disabused of such daydreams, he is unlikely to come to grips with the choice of a realistic vocational goal. The counselor, the teacher, or the parent who helps the child to face this reality, yet leaves him with some sense of personal value and some positive feeling for a concrete and feasible plan for the future, has helped him in a very important prevocational step. This can be a rather emotional matter, and the youngster needs a kind and understanding supporter, but one who is absolutely honest.

Fundamental Skills Needed

Another significant step in rehabilitation at the prevocational level is acquiring real skills in fundamentals which will be needed in the chosen job, perhaps a real command of simple arithmetic so that it can be done quickly and with almost complete accuracy, perhaps a real command of spelling or of typing or of braille. The particular skills which are important depend on the vocational goal, but for many children there is a huge step, not only in actual knowledge, but also in attitude toward accuracy, between what is "passing" in school (sometimes only 70 or 65 percent), and what constitutes enough accuracy to use the skill in the job. The dictaphone typist cannot succeed if only 65 percent of the words are correctly spelled or typed; the vending stand operator will soon lose his job if he gives correct change only 65 percent of the time.

Of course, there are people who just cannot seem to learn arithmetic or spelling, but it is surprising how quickly most children of normal mentality can attain a high degree of accuracy in the fundamentals, if they know such accuracy is necessary. The teacher who sets high standards and helps students to develop self discipline and pride in good workmanship is helping in rehabilitation.

Counseling and Testing

For most young people counseling is a very important part of the rehabilitation process, and it is often done almost unintentionally by someone who is not called a rehabilitation counselor at all. Every individual chooses his own counselor, and often it is not the person who is paid to counsel him or the person who is assigned to him by a state agency. The impressionable youngster picks up attitudes toward jobs and attitudes toward himself from many sources, but particularly from people whom he admires and who may not even know of his admiration or guess that he is patterning himself in their image. Quite apart from this kind of informal and unintentional "counseling," there is the long process of moderately planned counseling which consists of giving information about jobs, giving the individual information about himself and his abilities, and thoughtfully guiding the young person to bring these two kinds of knowledge together in a meaningful way. Teachers contribute a great deal to this, and of course the school counselor and the agency counselor build their whole jobs around this function. Perhaps the thing that seems most important is that

counseling and guidance must take place over a long period of time and may include every remark in which a teacher, for example, implies a value for a certain kind of work, says this is easy and that is hard, this is interesting or that is dangerous, and this calls for originality or that is monotonous and repetitive. Beware of remarks which reflect purely your own emotions and prejudices; they may keep a child from considering a job area which is well suited to him. Try to speak about the world of work in terms of facts and remember it is a good thing some people want to do the jobs you do not like!

This brings us to the fact that giving information about the world of work is a very important element in rehabilitation, especially at the prevocational level. Visits to plants, agencies, etc., so that the young person may observe jobs in action, perhaps even talk with workers, are extremely important and should be arranged as often as possible. Career Days and similar activities which bring workers to students in school are growth experiences of tremendous value for most teenagers. Do not think that young people take these experiences lightly or quickly forget them. I have had young people quote with considerable exactness what Career Day speakers said two or three years prior to the time they were talking to me.

An important step in improving the young person's knowledge of himself is psychological testing, including measures of general and special ability, of interest, and of personality as it is pertinent to vocational adjustment. Even though some, if not all, of these qualities may be in flux, for interests and personality often change rapidly during the teens, the individual at least begins to see himself through impartial measures when is informed in a frank but sympathetic way of his test results. Obviously tests also help the counselor to see the child in an objective, impartial way and may disclose abilities, interests, or emotional problems which were not evident even in the relatively close contacts of a residential school.

State Agencies and Services

When the child has a visual handicap, or any other serious physical, mental, or emotional handicap, he is a candidate for the assistance of the state rehabilitation agency. However, in some areas, especially in New York City, the major counseling and guidance service may be offered by a private agency.

With minor variations dependent upon state policy, the state agency can offer ophthalmological and physical examinations and additional examinations by specialists if needed, physical restoration if it could be helpful, psychological evaluation, vocational and personal counseling, appropriate training including college and even graduate school, reader service if the child cannot read for himself, books and supplies, and finally placement or aid in finding suitable employment. This rehabilitation service is not only available to the teenager but will continue to be available throughout the individual's working life if he should lose his job or have good reason for changing employment.

It is extremely important for the teacher and/or school counselor to know thoroughly the service offered by the state agency and to bring the child into contact with that agency at the earliest time possible within the regulations of the particular state. The child and his family may not be aware of these very extensive services. School staff should know them, should know just what they can offer so they do not mislead the family into expecting what cannot be given, and should get the student and the agency together--not merely

give an address to the child and leave it to him. Furthermore, the school should be able and willing to give the agency appropriate information not only about the basic school record and extracurricular activities of the child, but any available test results and comments by teachers and other staff which could bear upon counseling of the child. These help immensely. In other words, it is extremely important that the school and the agency work together for the benefit of the child.

In many states, additional services are made available at the prevocational level. For example, mobility training is offered, and sometimes this is part of a much larger training opportunity which includes other skills related to personal independence, job tryouts in a shop setting, and actual training designed not to make an individual proficient in a particular job but to enable him and his counselor further to evaluate his ability. This type of prevocational training, which frequently includes training in homemaking as well as industrial skills, not only contributes better understanding of specific job content but it shows the young person more nearly what the standards of speed and accuracy and good work habits are on a real job.

Many states provide a special course of training for college bound youth. Although the structure of this varies from place to place, it usually includes opportunities to assess and improve such fundamental skills as braille and typing, some experience in writing papers, using a library, etc. In some places this training is given during the summer on a college campus, and the high school student actually takes one course taught by a college professor so he has the experience of taking notes, taking examinations, and preparing a term paper. This not only assists the student and the counselor to evaluate his preparation for college, but eases him into the procedures and demands of college life so that he has less of a sense of shock when he goes to the campus as a fulltime student.

Goal of Rehabilitation

Although I have pictured rehabilitation as a long process, often affected by events relatively early in a child's life, and to some extent continuing into adult years when job changes may be necessary or additional skills are added to make job growth possible, we usually think of the rehabilitation process as culminating in placement on a job. This is where all of the daydreams, the general and specialized training, and the counseling and guidance are tried and measured for suceess in the cold practical light of job demands and, for the individual, of career rewards. There is no real rehabilitation unless the individual fits the job in terms of his ability, his training, his interests and at least such personality qualities as motivation, persistence, and being able to work with those around him. Nor is there any real rehabilitation unless the job fits the individual's needs for exercise of his abilities, opportunities to show growth and to advance, sufficient financial reward so that he is secure and can take care of his family, and such personal satisfactions as friends among his fellow workers and pride in a job well done. The employer must be at least reasonably proud of the worker, the the worker must feel reasonably proud of his job and of the way he functions in it. Everything which contributes to bringing the right man and the right job together is a factor in rehabilitation.

ABSTRACT

THE ORGANIZATION, COOPERATION, AND COORDINATION OF STATE PROGRAMS FOR VISUALLY HANDICAPPED CHILDREN

by

Robert D. Cain

The state of Illinois is on the threshold of entering a very comprehensive and mandatory statewide plan of special education which exemplified the organization, cooperation, and coordination of state programs for visually handicapped children. Legislation, which was passed by the General Assembly in 1965, mandates establishment of special classes for all types of handicapped children by 1969. The four year interim provides time for a well defined developmental plan to be implemented. The final outcome will be special classes provided for, either at the local school district level or through joint agreements composed of local districts within a county or counties.

Planning began with a census of all exceptional children. Each of the 102 counties within the state of Illinois are authorized by law to draw up a comprehensive educational plan. These plans are to be submitted to a seven member State Advisory Council for Handicapped Children for approval. The Council has two ex officio members which represent other state agencies. Approval of plans is contingent upon comprehensive programs using all available resources within the state.

Also included in the recent legislation was the provision for an Educational Materials Coordinating Unit to provide materials to the visually handicapped. This is a direct service administered by the Office of the Superintendent of Public Instruction. The Center, one of the first of its kind in the nation, has received supplementary support through a Research and Demonstration Grant from the US Office of Education. In addition to the directly library function, the Center is involved in the production of material, the establishment of standards for the production of material, and the certification of volunteers involved in this production. As a coordinating unit, it will ultimately be responsible for assuming the responsiblities of acting as a clearinghouse for information relative to the availability of services and material for the education of visually handicapped children and adults.

ORGANIZATION, COOPERATION, AND COORDINATION OF PROGRAMS FOR VISUALLY HANDICAPPED CHILDREN IN NEW JERSEY

by

Vahram Kashmanian

In the early nineteenth century, New Jersey did not follow the pattern of other populous states in the Northeast by establishing a residential school for the blind. Perhaps its being a geographically small state, with Philadelphia and New York City on its borders, negated the need for one.

As a result, all blind students from New Jersey were educated in neighboring states until 1910, when a program for blind children was

established in the public schools of Newark. Soon thereafter, the New Jersey State Commission for the Blind was created. Since that time, day school programs have developed in New Jersey, through the cooperation of the State Department of Education, the Commission for the Blind, and local communities, to the point that the large majority of blind and severely visually handicapped students now attend their local schools.

This is made possible by a coordination of services by the Educational Department of the New Jersey Commission for the Blind, the State Department of Education, parents, local schools, doctors, social workers, psychologists, and others.

Placement Through Educational Department

The Commission's Educational Department begins to work with blind children at infancy and carries through higher education. Students are referred to us from many sources. Having worked with physicians for five decades or more, our educational program is widely known by the medical profession and we receive referrals from doctors whenever a child is examined and found to have a severe visual loss. Parents learn of our services and apply directly. School nurses make referrals upon discovering visual problems in the public or private schools. Referrals can come to us from almost any source, however an application for service by the parents or legal guardian is necessary for us to register and provide services.

Our referral system makes known to us most severely visually impaired infants. We have developed an ongoing program in the blind child's home which we feel is necessary for his proper development and growth. Approximately 20 of our counselors have preschool children and provide guidance and counseling to the parents. In addition we have diagnostic services to help us measure ability and social maturity. Medical services relative to eye care are provided to the child when the family is unable to neet this need. Our library keeps in stock preschool materials which are loaned or given to the child.

At about age four, nursery school placements are made for these children, and our instructors provide continuous guidance to the administration and teachers.

All this is important to us in helping us to know the child and give him the best possible base upon which to build his school experience. Our preschool program gives support to the parents and hope for their children's futures. It leads to the next important agency function--choice of a proper educational program. In New Jersey this might include any of the following: public school placement, residential school placement, special treatment centers, such as the Boston Center for Blind Children, Royer-Greaves, or institutional placement.

In determining proper school placement, the parents' wishes are considered, however educational decisions are made on a team basis by a group utilizing a medical examiner, a psychologist, a representative of the New Jersey State Commission for the Blind, a school social worker, and a learning disability specialist.

I will not pursue what happens to children entering programs other than public school, except to say that their progress is reviewed and, whenever possible, those so placed are returned to their homes and local schools.

Staff, Instruction, Materials

In most cases blind children enter kindergarten at about age six. It is felt that the additional maturity is an important factor in successful adjustment and gives our instructor a chance to begin reading readiness and instruction in reading, prior to entrance into the first grade. This head start gives the student the opportunity to participate more fully and comfortably in the regular school program.

Instruction is provided by one of 30 instructors, all of whom must certify as public school teachers and also as teachers of the blind. This certification is handled through the State Department of Education. Those who do not meet the requirements may be employed under provisional certificates which require that a small number of credits be earned each year until regular certification requirements are met.

Most of our instructors are assigned caseloads by areas and population. Some, in the sparsely settled south or northwest portions of the state, must travel long distances in visiting the schools or homes of their students. A few are specialists--one works primarily with high school guidance; another is responsible for our college program. Two work almost entirely with multiply handicapped younger children; one with the retarded blind in regular school programs, and one with those cases which are headed for institutions. We also have one instructor who serves as our coordinator between residential schools, our agency, and the students' homes.

In addition to the 30 instructors, our professional staff includes a Director of Educational Services, and four supervisors; a supervisor of preschool and elementary programs, a supervisor of secondary and college programs, a supervisor of our Textbooks and Materials Center, and an unfilled position of supervisor for the multiply handicapped.

Once a child has entered a regular school program, our instructors will see him as often as deemed necessary, consistent with the need to serve the total caseload. Of necessity, students who use braille as their reading medium are seen most frequently. Our instructors who provide the tutoring in this area attempt to get into the schools three or four times a week during those years when the child is first learning to read. They also teach the child braille math and see to it that he or she progresses, whenever possible, at the same rate as sighted classmates.

Our Textbooks and Materials Center works with a number of dedicated volunteer groups in seeing that the same texts used by the students' sighted classmastes are made available in braille.

At about the fourth grade level, our instructor begins typing instruction and works with the child on an individual basis to develop this important skill, particularly important in the public school situations where teachers can't read braille.

Our instructor also works with the teacher in providing additional materials, models, and tools. As the child masters his braille and typing skills, the counselor visits with him less frequently. Each year, our instructor meets with the new teachers to explain our services, see that necessary materials are provided, and that the child is able to participate as fully as possible in all school activities.

Our Material and Textbooks Center makes available to the student two

braille writers, one for school and one for home use. Also provided are two typewriters, and, when the students are old enough to begin to use recorded materials, one talking book machine and one tape recorder. The Center makes available materials in braille, in large print, on tapes and records, as well as any models or equipment which we feel would assist the student in his studies.

If we meet with difficulty or resistance at a local school level, our instructors try to explain to the local school officials how, with our assistance, these students will be able to succeed in the regular school program. However, we do occasionally have to use the good offices of the Child Studies Supervisor who is employed by the State Department of Education and serves all handicapped students, at the county level, in the 21 counties which make up the state. New Jersey law clearly states that diagnosis, classification, and placement should be so focused as to first consider the individual handicapped child, secondly other children, and thirdly the community in which the child lives and functions. This means that if it is determined that the best placement for a child is his local public school they must accept him despite any reluctance they might have. Fortunately, in most instances the children are able to make such good adjustments that resistance to having them fades away.

As the child proceeds through the grades and develops his skills, our instructor visits the class less often until, at the high school level, a braille student may be seen only occasionally. The whole objective is to make the student as self sufficient as possible.

An invaluable assistance to us has been a State Law which is known as the Beadleston Act. This provides for tutorial assistance for all handicapped students in the public schools up to one hour per day. Almost all of our severely visually handicapped students begin to receive this tutorial help in the first grade, and in one two cases it has even been begun at the kindergarten level. These tutors must be certified public school teachers, and the State reimburses the local school board 50 percent of the cost of hiring the teacher. These people work with our children in almost any area where there is an indication that he could benefit from a one to one relationship. With young children, this might involve how to use scissors, fold paper, work with any type of manipulative equipment, etc. As the child progresses through the grades the tutorial help is provided in areas of need. Our instructors will teach a child the Nemeth Code, however, if the student is having some trouble in math, a math teacher is hired as the tutor. This supplemental instruction is available to public school students through high school in any subject area.

Also, for older students the agency provides up to $400 per student in reader service. Either fellow students or teachers can be hired for this purpose. Since we feel an adult would be more serious and would be more likely to do a better job, we pay a higher hourly rate for adult readers. Since our Materials and Textbooks Center can only provide the basic textbooks, reader service is an essential for completing the short term assignments and doing research or library work.

Still another service necessary to a successful public school program is adequate psychological evaluation. We are very fortunate in having a psychologist with considerable experience in testing the blind on our staff. She tests most of our younger children. Our proximity to Philadelphia has enabled us to purchase the services of the Personnel Research Center, in doing IQ tests, tests of manipulative skills, interest inventories, and personality inventories

on our older students. We make an effort to have each severely visually handicapped child tested once every three years.

While responsibility for the education of blind and severely visually handicapped students is a direct responsibility of the State Commission for the Blind in most instances, there are classes in seven of the major cities and responsibility and control over educational policies and procedures rests with those communities within the framework of State law, of course. The Commission does act in an advisory capacity toward these classes.

Other Departments and Programs

The Educational Department is one part of the State Commission for the Blind, which in addition has a Home Service Department, an Eye Health Department, and a Vocational Rehabilitation Department. The Educational Department works quite closely with the Eye Health and Rehabilitation Departments, since they give services which we can utilize in our work with our young people.

The Eye Health Department provides necessary medical assistance and/or prosthesis. The Vocational Rehabilitation Department is that arm of this agency with which we have the most frequent contact. All of our students, except those who end up in institutions, or recover enough sight so that they no longer need us, are eventually referred to our Rehabilitation Service. Those that go on to college continue to be registered with the Education Department and are served by an educational counselor and our Textbooks and Materials Center. Rehabilitation provides the all important money which provides services to a greater or lesser degree to practically all of our students who go on into higher education.

For those who go on to college, plans for Vocational Rehabilitation are worked out in partnership with the Rehabilitation Department; and, upon completion of training, the case is turned over to the Rehabilitation Department, where the final necessary paper work is done and job placement takes place. (About 95 percent go on and find jobs in line with their training and inter ests.)

Another important program provided in conjunction with our Rehabilitation is the summer program for teenage students. These summer programs have been run with three different types of groups: the college bound, academic but noncollege bound, and the slow learners. The objectives with each group vary, but all serve an important evaluative purpose, telling us something about the weaknesses in the students' backgrounds and giving us knowledge of areas which need concentrated attention. Vocational information and skills required in meeting the needs of day to day living are provided.

The Educational Department also runs a summer program for children between the ages of seven and 16. This provides an opportunity for us to observe the child in a setting outside his home in order to determine areas which need concentrated attention; dress, manners, and health activities can all be stressed here. In addition, a regular camp program with all that it involves in the way of pleasurable activities is provided. Tutorial help is available to those students in areas of arithmetic and reading.

Community agencies are also utilized in providing health counseling and social services.

In a short paper it is literally impossible to mention every way in

in which we work with others in making this type of program work. Without our volunteer transcribers, the cooperation of the State Department of Education and the assistance of countless others it would be impossible to keep these young blind people at home and functioning in their communities.

ABSTRACT

PREPARATION OF TEACHERS FOR MULTI-HANDICAPPED CHILDREN

by

Philip H. Hatlen

Adequately prepared teachers of multihandicapped children must have concentrated and extended experience with children. It is evident that to achieve this many programs would need to reorganize their orientation. Realization of effective program change would necessitate altered requirements for candidacy.

These requirements could consist of: (a) credential at either elementary or secondary level, (b) experience in working with handicapped children in some capacity, and (c) course work in the general area of education of exceptional children, in growth and development, in patterns of learning in children, in psychological aspects or implications of impairments.

The candidates would then be involved in one year of study specifically directed toward:

1. First semester:

    a. observation, first four weeks
    b. internship, twelve weeks or the balance of the semester
    c. seminar, to accompany and be intimately associated with internship experience
    d. independent study
    e. electives
    f. counseling;

2. Second semester:

    a. student teaching, a minimum of 300 hours
    b. seminar, directly related to student teaching experience and often taught by the master teacher
    c. independent study
    d. electives.

There is nothing new or different about individual courses in this sequence, only the emphasis is different. Instead of requiring a number of lecture, methods, or skill courses, the emphasis is on direct work with children. With multihandicapped children, the whole child is not equal to the sum of his parts. Each one brings to the classroom a complexity of type, degree, and effect of impairment to learning. Concomitant is the necessity of interdisciplinary approaches within our categories of special education. It is time that we in special education who are concerned with multihandicapped children stopped looking at disciplines and began looking at problems.

THE ADDED DIMENSION TO TEACHER EDUCATION

by

Clarice E. Manshardt

Introduction

Generally education reflects tradition. It too seldom assumes leadership in bringing about change. To reverse this pattern in the field of teacher preparation programs for the visually handicapped is a challenge worthy of careful consideration and of much insight. One strategy to effect such a desired change would be to add or implement a critically needed dimension to these programs as they now are being offered.

In general, it might be said that pedagogy, practicum, and insight represent the three most commonly accepted dimensions of teacher preparation. For purposes of this presentation these terms are described: (a) pedagogy refers to those areas of preparation concerned with the theoretical bases for teaching, learning, and methodology, (b) practicum includes all laboratory or field experiences such as observation and directed teaching with their accompanying evaluative seminars, and (c) insight designates those preparation areas related to the understanding of individual differences, sound guidance procedures and the development of positive, accepting attitudes toward children. Basic as these dimensions are, it is proposed that their ultimate effectiveness can be significantly influenced and enhanced by the development of a fourth dimension, that of evaluation.

The Added Dimension Defined

Dr. Norman Topping (1965) president of the University of Southern California, pointed out, "It is indeed paradoxical that...universities spend millions in attempts to uncover secrets of the cosmos, but have spent comparatively nothing in dollars or time in taking regular stock of themselves...the value of their teaching program or the reality of their objectives (p. 5)."

The phenomenal growth in teacher preparation programs in the visually handicapped field is due in large part to the support through fellowships from the US Office of Health, Education and Welfare and provides further impetus to assessing practices and procedures. Followup studies on graduates are traditional and basic. However, to assume a leadership role, it is proposed that the fourth dimension, that of program evaluation, must include, but transcend this approach.

To accomplish this objective it is suggested that the following components form the structure of the evaluation dimension:

1. Provision of a basis for course improvement through followup studies

2. Exploration of methods for bridging the gap between theoretical constructs and practice

3. Identification of the college role in stimulating continued teacher growth.

Werdell (1966) points out that evaluation is without value unless accompanied by creativity in ideas and some means of implementation of them.

Course improvement and general program improvement can begin through application of both usual and unusual procedures.

Followup

The usual followup procedure involves the use of a mailed questionnaire and its subsequent analysis. A study of typical followup questionnaires reveals that information sought usually falls into the following categories:

1. Mastery of teaching skills related to subject areas
2. Familiarity with materials
3. Understanding of curriculum in both sequence and scope
4. Techniques for understanding and helping pupils
5. Relationship of educational procedures and philosophies of the special area to the educational field at large
6. Understanding and usefulness of theoretical constructs
7. Effectiveness of administrative and advisement procedures of the institution
8. Specific suggestions for program modification.

A more unusual procedure involves a series of planned discussions for graduates to talk over experiences and problems encountered in the field with personnel in the training institution. A questionnaire may be used as a part of the series. The Special Education Department of California State College at Los Angeles has utilized a questionnaire as a part of discussion meetings with graduate fellows in the areas of teacher preparation for mentally retarded and orthopedically handicapped. A modified form to be used with graduates of the visually handicapped teacher preparation program is appended.

A prior, more simplified questionnaire used both by teachers in training and some graduates of the visually handicapped program, demonstrated the value of the usual followup technique in that the analysis of the responses resulted in course revisions to avoid overlap, to enrich content, and to extend material resources. It is anticipated that the modified questionnaire and improved method of presentation will result in still further program improvement.

A further innovative followup procedure involves assigning responsible college personnel to observe a selected sample of graduates in action. Observational data is recorded and used as a basis for evaluation of the training program as well as constructive consultation with the graduate. Its effectiveness in terms of identification of needs, strengths, and weaknesses of the teacher preparation program overwhelmingly justifies the implied budgetary considerations related to staff time allotments.

Bridging the Gap

Evaluation should provide a vehicle both to identify gaps between theory and practice and some strategies for closing them. Often teacher preparation programs are plagued with realities of insufficient time and multitudinous

requirements. Students in training have extremely limited exposure to the ideas and materials they are to learn. The critical question is how can this exposure be made to count both in thought and deed? Bruner (1962) suggests some meaningful approaches. First, the curricula of teacher preparation courses should be planned and taught so that the learner gains an understanding of its fundamental structure, rather than mastery only of facts and techniques. Closely related to this is the application of the technique of method of discovery enhanced by the encouragement of intuitive thinking through the nature and criteria for assignments and class projects.

Second, there should be an extension of the creative use of teaching devices which "aid in extending the student's range of experience, in helping him understand the underlying structure of the materials he is learning and in dramatizing the significance of what he is learning (Bruner, 1962, p. 84)." Sequential materials are needed, such as the Ashcroft and Henderson "Programed Instruction in Braille," which is an excellent example. Or, carefully guided laboratory experiences in observation of children and teachers at work, and in depth analysis of directed teaching experiences through regularly scheduled followup seminars are valuable.

Finally, those involved in the teaching of teachers need to internalize the idea that the teacher is not only a communicator but a model. The impact of this is highlighted when it is realized that studies show beginning teachers will teach as they were taught in college. Thus, the "model" in the preparation program is critically important.

Continued Teacher Growth

A third component of evaluation involves the extension of the college role in stimulating continued teacher growth. It is interesting to note that the recently announced Triple T Project to be funded in late 1968 or early 1969 under the Education Professions Development Act recognizes this needed facet. Its basic assumption is that preservice and inservice education are not separate concepts...that teacher training in and out of universities ought to be coordinated with teacher training in and out of the schools themselves.

Refinement of procedures for providing the "master teacher" with a clearer understanding of his role as it related to the total process of teacher preparation could provide a fruitful area of exploration. Planned meetings, on a continuing basis, of college personnel and those serving as "master teachers" could provide opportunities not only to define roles but to evaluate the strengths and needs of the preparation program as they are reflected in student classroom performance. Further, this relationship might well afford avenues of growth for the master teacher through an increased awareness of new techniques and the implications of research as related both to the visually handicapped and to the general fields of learning theory and behavior modification. Recognizing the practical realities of both teacher and staff loads, it is proposed that one such meeting each semester or quarter might be feasible and could contribute greatly to program improvement and continued teacher growth. Some exploration of arranging a worthwhile exchange between groups of teachers whose training experience is closely related in time, i.e. teachers currently in preparation and beginning teachers in the field, seems to hold promise. During the past three quarters at California State College at Los Angeles, prospective teachers of the visually handicapped have spent several planned days with "first year" teachers as a part of their observational laboratory assignments. Preplanning was done with the host graduates. Subsequent evaluation consisted of both joint and separate conferences with the

two groups involved. Analysis of the conferences revealed a healthy growth in awareness of both practical problems being faced in the classroom and a genuine search for deepened understandings and application of theories and techniques. Discussions included such concerns as the unconscious operation of stereotypical thinking in relation to limitation of physical education activities for some low vision children, realistic expectations for blind students in drill type assignments and the teacher's responsibility for basic orientation skills.

The extension of college and local school sponsored workshops and institutes has been and will continue to be a major source of stimulation to teacher growth. Their range of content can be limitless but it is hoped they will continue to blend practical problems with scientific findings of research, basic learning, and behavior constructs. Thus they can provide impetus to self evaluation, stimulation to continuing intellectual curiosity, and deepened insight and excitement about the children and youth being served.

Conclusion

Education is not a matter of osmosis but must be earned and acquired through persistent effort throughout life. Indeed, it is a continuous and ongoing process. But evaluation, too, is a continuous, ongoing, and planned process. Often it involves many people and multiple approaches. Teacher preparation programs may be a particularly effective instrument in these processes when in addition to pedagogy, practicum and insight, the dimension of evaluation is added. Through such implementation it is hoped that an increasing number of teachers in the field, paraphrasing Gardner (1964), will reflect a capacity to remain versatile and adaptive and will more successfully resist being trapped by techniques, procedures, and routines, or imprisoned by their own pet theories, comfortable habits, and customary ways. Rather, it is hoped that they will be characterized by a certain flexibility of mind, a willingness to listen and learn, and eagerness to try a new way.

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SENSORY AIDS: RESEARCH AND DEVELOPMENT TRENDS AND THE QUESTION OF TRANSLATION INTO PRACTICE

by

Leslie L. Clark

Introduction

The purpose of this paper is to give a review of sensory aids research and development. In addition, an attempt will be made to organize these developments around the perspectives of the educator. The content of these developments is, of course, of primary interest; but the nature of the communication link between the researcher and the practitioner implied here is equally important and will become a most important focus of later discussion.

This communication link is influenced by a number of factors beside the content; among them are the norms which obtain in the respective domains of research and of education, in thinking and in work, the division of labor to which each domain is subject, and the network of communication links between them. This emphasis may seem strange to one not having at least a passing acquaintance with researchers and with educators, each in his own environment. If, for example, the main job of educators is to educate, that is, to make a student aware of the variety of bodies of knowledge atound him, and to provide him with a variety of experiences, then this implies in the case of the sensorily impaired child a number of consequences. Among them are that one must provide as many possible avenues of information input as one can manage, and that one utilize every resource to provide a meaningful transformation of the features of the sighted world for the child. This means an attempt to translate what we see into what an impaired child can hear or, to avoid overloading the auditory channel, into what he can tactually perceive and experience. It means our providing some means for the child to navigate in the world about him, and some idea of what it means to orient and to navigate. These are difficult tasks, and that fact may help explain some of the many failures of sensory aids to do what they were supposed to do, in the past.

The emphasis here is on the provision of options for information input to the child. No one sensory aid functions the same way for two individuals; indeed, we have found that personality factors, inherent sensory and motor capabilities, the tolerance for ambiguity, and intelligence-all are related to success with a sensory aid. To match intelligently the sensory aids we develop, and the children for whom they are designed, we are forced to keep in mind the distribution of these characteristics among the groups for which aids are designed.

It is in the context of these remarks that I should like to sketch some current efforts to develop sensory aids for the blind and visually impaired: first aids to reading, the mobility aids, and the role of the computer in both. In a second section of the paper some implications of these developments will be considered, the influence of the organization and nature of the researcher's and the educator's world on the conduct of the communication between them will be discussed and the question of the translation of research findings into educational practice will be presented.

I. Sensory Aids Research and Development

Reading Aids: Direct Translation

Devices or device systems which permit direct access to the printed page are of two general types: the direct translation device and the character recognition device. The former class has a rather long history, for in 1912, Fournier d'Albe developed the Optophone at Cambridge University, England. The original principle has been carried through many engineering refinements: it is simply that the output from an array, or matrix, of cells responsive to light is coupled to a bank of sound generators; when a letter or character appears in the field of view of the photocell array, a sound output is heard for that portion of the field which is illuminated, and no sound output is heard for that portion of the field in which the illumination is absorbed by a black surface. Thus, the tonal output varies, depending on which of the array of cells is stimulated at a particular moment of scan. The auditory display is chordal in nature, and indeed early attempts stressed the musical progression of tones from one cell of the matrix to the next. The latest version of the optophone class of devices was developed at Battelle Memorial Institute. Following its engineering refinement, a considerable effort was invested in the development of a training course of 200 hours to instruct users of the device. This aid-and when "optophone" devices are discussed, the Battelle device is probably meant today-has been used by a small group of persons in Ohio and Chicago; and it is currently undergoing evaluation under controlled conditions at the American Center for Research in Newton, Massachusetts. Reports from that Center indicate the very great difficulty in maintaining a subject population over time (not the least of the difficulties in evaluation of sensory aids. From the preliminary results available so far, it is probably safe to infer that optophone devices have a role as a personal reading aid for some persons, even though we cannot expect reading rates of much higher than five to ten words a minute when using it. This should be sufficient for reading checks, labels, and personal letters. In addition, this class of aid is light, compact, portable, and relatively inexpensive. For a skilled user it permits access to a fairly wide variety of type fonts and type writer prints.

Another type of direct translation aid is being developed at the Stanford Research Institute (SRI). This device also uses an array of photocells to sense the patterns of light and dark on the printed page, character by character; but the display is tactile rather than auditory, and consists, essentially, of an enlarged image of the letter outline. The interface is an array of piezoelectric bimorph reeds which vibrate in response to an applied voltage. To date, the action of the device has been simulated by a computer generating the control signals to the tactile display from a punched paper tape. This mock up has permitted the investigators to conduct a remarkable series of studies of the factors involved in tactile discrimination and information transfer, results which indicate clearly that previously held views of the limitations of tactile communication must be altered radically upward to account for the capabilities of that sense modality. The display is moved against the stationary fingers of one hand in a manner similar to the travelling news signs on the Allied Chemical building in New York. Note that it is possible, in this equipment cofiguration, to vary the number of characters appearing in the display field. This fact has let to a number of characters appearing in the display field. This fact has led to a number of studies of short term tactile memory, and to a seminal paper on a model of a sensory register which we plan to publish in the near future (Bliss and Hill, 1968).

SRI recently received a substantial grant to develop 50 prototypes of the bimorph display reading aid, using the most sophisticated techniques of fabrication available. The aids will be, it is hoped, the hand held size most desired, and will make extensive use of monolithic integrated circuitry. A further grant will then be sought for evaluation and training with the device.

This class of devices, that is, direct translation devices, requires

highly motivated users. And the need for a "tonal memory" may have to be reinterpreted in terms of the model of the sensory register mentioned above. It is found, for example, that reading rates with tactile displays are reliably associated with intelligence level and with length of training; in part this last factor is confounded with whether the user is congenitally or adventitiously blind (the former having had longer practice with tactile stimulation to convey information). It is also known from more general studies that there is a relationship among the capabilities of the several modalities which may reflect some central cortical processes; it is not surprising, then, that if braille requires a character by character assimilation, as some informed researchers contend, that a similar process of assimilation of stimuli occurs in the auditory channel, using the optophone. The conclusion should be mentioned that the capabilities required of the user of these devices limit them to a small subpopulation of potential blind and visually impaired users; it is a conslusion we shall come back to over and over again, and one which has some rather general implications.

Reading Aids: Recognition

The other class of reading aids is that of the character recognition machine, or device, or system. These transfer the difficult parts of the interpretation of the output of a scanner to the machine itself, which is provided with logic and data reduction circuitry, and which produces an output of spelled letters, or a letter outline, or letter by letter braille. Such a machine (with several output options) has been under development at the Mauch Laboratories for some years; and a suitable spelled speech language (in which the letters are modified by removing "beginnings" and "endings" of letters on a tape recording, then removing most of the spaces between letters spelled out) has been developed by Metfessel and Lovell at USLA. These devices also permit rather high rates of reading-60 to 120 wpm (i.e., half the reading rate of the sighted), and the accuracy of recognition of various type font letters is high: 90 to 95 percent in the Mauch device.

The version of this device nearest the optophone principle is called the Visotoner, and it produces a nine tone code for auditory interpretation.

This type device is predictably complicated and predictably expensive. Cost estimates run between three and five thousand dollars if a run of a thousand or so is manufactured, which would be no small achievement, given the difficulties of production of sensory aids in the United States.

A similar device would result from an ingenious program in which a character recognition machine has been simulated on a computer at MIT; here an algorithm has been constructed for feature construction of the letters, and fed to a spelled speech output. It could be produced within two to five years, if a serious effort was made to do so.

Since speech is the most natural display for humans, many persons will ask, why not go directly from the printed page to speech? The answer is that this class of machine, one example of which (for memory and output) is now under development at Haskins Laboratories, is still more complex and costly than the character recognition machines already described. In fact, the heart of the device is the equivalent of a special purpose computer, which takes a Teletypesetter tape input to the processing program, compares it to a dictionary of words stored in the machine, and when a match is found, a prerecorded spoken equivalent of the stored word is read out. (Words not stored are spelled out through a subprogram in the computer.)

Many variations are possible on this equipment configuration, each variation adding to the cost and complexity of the device. For example, one might wish to incorporate optical character recognition at the input stage, so that

the machine could read ink print directly; one could also demand that the machine dispense with a stored dictionary of words and depend on the generation of synthetic speech at the output. One practical advantage of the first variation is that a wider variety of ink print text fonts can be read, and input speed is enormous; a theoretical advantage of the latter variation is that as we learn more about synthetic speech, we should be able to make the output sound more and more like that of a normal human reader. The rather slow output of this type of machine (around 20 words per minute) is not a disadvantage, since one can keep it working 24 hours a day, record the output on magnetic tapes, and duplicate the tapes on request from a reader. There are other variations on the use of this device, or rather this system of machines, which will be mentioned in the discussion of computer capabilities. The readout rates from the system can be about 100 words per minute, but with some modifications the rate could easily be lifted from 300 to 500 words per minute without time compression. The cost of $50,000 to $100,000 would limit the machine to a central service facility. There is no reason to believe that not more than a few systems could be efficiently used, which will keep the price rather high, tend to make each machine a little more expensive than the last, unless several were built at the same time.

Talking Books

Reading aids for the blind and visually impaired must also include the talking book and large print. I shall go into the matter of large print type somewhat later on; I should like to mention here a few facets of recent developments in talking books. There is also a great deal of activity in the area of enhancing the availability of braille which may be of interest.

The US Library of Congress and the Royal National Institute for the Blind, in the United Kingdom, have both been developing tape talking book programs around tape cassettes. In this area, the British are considerably in advance of the rest of the world, for they converted their entire talking book program to the tape cassette system some years ago. Evolutionary developments in both countries have resulted in playback machines which are all solid state, rugged, reliable, adapted to the needs of the physically handicapped, and relatively inexpensive. Cassettes are now in production which are similar to the Phillips type used in smaller portable tape recorders, contain a book per cassette, and weigh less than a pound. Commercial portable tape cassette machines are now more suited to the needs of blind and multiply impaired users: they have evolved into campact and dependable machines for the use of the sighted.

The United States continues to be the largest user of disc talking books; but here too evolutionary developments have introduced many changes. With the development of suitable reproduction from inexpensive components, the practical utilization of eight and one-third rpm recordings became possible; augmented by the introduction of low cost disposable plastic discs, the new speed brings the talking book user nearer the world of the "journal parlant," so popular for the last decade in Europe. The increase in the number of magazines available to the blind reader because of these developments was foreseen by the noted conductor and acoustician Hermann Schercher. He proposed a daily newspaper for the blind in 1960, adapting techniques then common in Europe for producing paper discs.

Speech Compression

I have already mentioned time compression of speech, and this technique, which has captured so much popular interest, has a special relevance to an educator. The techniques for speech compression are well described in the literature (Foulke, 1967). Among the devices or methods used are the Eltro Information Rate Changer, the Varivox, the early Fairbanks machines developed at the University of Illinois, the use of a general purpose computer with appropriate programing, and harmonic speech analyzer designed by Bell Telephone Laboratories

and under development at the American Foundation for the Blind. Of all these methods, only the Eltro device is a commercial practicality, although all the methods are used for experimental purposes. There are aspects of the use of this information compression method, highly relevant to educators, that are now coming out of behavioral research. The following conclusion seems fairly well established: presentation rates of about 275 words per minute are feasible for relatively lengthy listening to some types of text material, while rates of about 475 words per minute are usable for short periods by motivated students who have learned to listen. This appears to be the upper limit of the presentation rate at present for practical uses, but I have reason to believe, having used these equipments, that it is a limitation due in part to the state of commercially available equipment; that with training in listening, and with equipment much more distortion free than is currently generally available, and with better understanding of the process of hearing, it may be possible to attend to material presented at rates up to 900 words per minute or so without undue fatigue, at least for brief intervals. No one would want to read recreational material at that speed, of course; but then, no one would probably wish to use compressed speech tapes for recreational purposes.

Braille

The enthusiasm of many technologists, and the exciting prospects for application of technology in this area, have generated much activity around braille as a communication medium.

It is also of singular importance that two psychosocial projects are about to deliver new data to our fund of knowledge on the use of braille. One is at the special education department of San Francisco State College and deals with the factors associated with degree of skill in the use of braille by students; the other is a perceptual analysis of braille reading at the American Printing House for the Blind in Louisville, Kentucky. The most outstanding result of the latter study has been mentioned, namely reading rates of braille are intimately related to the intelligence level of the student; but another important conclusion of the study is that braille is recognized a character at a time (hence the need for a good memory store). This result has been corroborated by another study at the Tennessee School for the Blind.

The implications of these studies, and the nature of the population of braille readers, assume major importance in the discussion of implications of technological advances in braille availability enhancement.

Most of the advances to be mentioned are computer dependent, in the sense that the enhancement of braille availability is made possible through the computer, and in the sense that the computer widens and complements the use of braille. This is the reason that Professor Mann of MIT has spoken of "enhancing the availability of braille (Mann, 1963)." Some of the recent applications are:

1. The construction of braille displays for the presentation of braille code stored on punched paper tape, magnetic tape, and in optical stores

2. The construction (at MIT) to the production prototype stage, and the building of a few copies, of a high speed braille embosser with a flying shuttle that can operate at a speed of 16 characters per second, and that can be driven by a computer program or by a paper tape (or other storage medium) as a small scale braille duplicator, as a readout device, or to print a simultaneous ink print and embossed copy of text, using a coordinated Teletypesetter

3. The development of at least three prototypes of systems using electrified Perkins braillewriters and punched paper tape storage of the braille infor-

mation, thus permitting small scale braille duplication quickly and inexpensively

4. The development of a printing system to print simultaneously ink print characters and the braille equivalent above them, in Brazil

5. A Japanese typewriter that will print Grade one braille, also with the ink print equivalent under each character

6. An electric typewriter from IBM with 63 keyboard characters capable of embossing both Grade one and Grade two braille

7. A computer program, called DOTSYS, developed at MIT, which will permit the automatic transcribing of braille from compositors' tapes now widely used in the production of ink print books and magazines

8. The modification of both Honeywell and IBM computer line printers to permit embossing of braille characters, at rates ranging up to 900 lines per minute

9. The use of computers to permit semiautomatic braille transcription in the US, Denmark, Germany, Israel, and the United Kingdom

10. The beginning of computer programs to permit the semiautomatic transcribing of mathematics and musical braille codes

11. The proposal of a reading service for the blind which combines teletransmission of scanned ink print characters over telephone lines to a central computer, and the display of the braille or of the enlarged ink print equivalent tactually in real time, i.e., immediately

12. The proposal of a real time braille information system in a school, in which a typed or scanned input at a console remote from a central computer is converted to braille code and sent back to a high speed braille embosser next to the typist thus producing an immediate braille equivalent

13. The exploration of optimum braille coding for high speed production of even Grade one braille.

Basic to all these advances is that a machine readable equivalent of the ink print or the braille text is made available for further processing. Once this fact is grasped, it is easy to see that the variations on the basic theme are almost endless. Their practicality will depend on the need for the systems, their cost, and the availability in a specific location of the means to build up the required system. The computer, particularly through its ability to simulate devices without the need to actually build them, makes possible much experimentation that would otherwise take much time and money. In one advanced project at the Research Laboratory of Electronics at MIT, for example, a computer has been used to simulate parts of a reading machine. The use of ingeniously contrived algerithms of coded letter feature data has indicated it is possible to build a character recognition machine at a cost of $3,000 to $5,000 which would have an accuracy of better than 97 percent, and would operate at speeds in excess of 100 words per minute.

It is now clear to researchers that, potentially, it would be possible to provide universal and instantaneous availability of braille, through the use of computer programs, input from remote keyboards, and real time translation and processing of the ink print characters. It is thus possible to conceive of an "audible reprint" service, linking computer processing of the ink print analogue and the output of the Haskins type reading machine to prepare tape recordings in

spoken English to send to the user via the mails or over telephone lines. A personal reading device system could link a small input reader, telephone lines for input and output, central processing, and the option of a tactile or spoken output.

There are other applications, implied by new knowledge gained from the design efforts now under way for third and fourth generation computer central processing units, which have relevance both for reading aids and mobility aids. As we gain more knowledge about how to handle these complicated translation and transmission tasks by ever more sophisticated means, there is considerable contribution to our understanding of the rather general principles of communication which operate in the visual and auditory channels of human beings themselves. Thus, by simulating the processes in living beings, we learn more about how animals actually process visual, auditory, and tactual information. In turn, this knowledge will allow a more exact appreciation of the requirements for extremely complicated systems of devices, and may lead some day to an actual visual prosthesis.

Those interested in the various configurations of components around a central time shared computer central processing unit should examine closely the excellent tabular summary of these prepared by Dr. Mann (1966).

Mobility Aids

Mobility aids have not had nearly so long a history as reading aids, at least as far as modern technology is concerned, although use of the staff and the sighted guide predate by centuries the use of special writing for blind persons. The modern history dates, in fact, only from the closing days of World War II, when the US Office of Scientific Research and Development sponsored a program in this area. The impact of that program has persisted to the present day. Major results center on instrumentation designed to detect and identify objects, determine terrain changes, and to sense the environment at a distance.

Although many inventors, especially individuals working outside of the knowledge of blindness and its peculiarities, have expected to produce a general solution to the problem of mobility for blind persons, no such general device has become available. Recent evaluative work on a few mobility devices, and on the individual differences in navigational ability, have given us some of the reasons why. Among these are the factors of personality variables, especially the ability to tolerate ambiguity, and the ability to organize complex information in a short term memory store, a constant for each individual tendency to veer from a straight line in travel, and the need and desire for mobility (Deatherage, 1965; R ley, Weil, and Cohen, 1966). The importance of the last item bears underscoring, and perhaps the best illustration for our need to think through the requirements of potential travelers is to cite Eric Josephson's (1965) tongue in cheek prediction that with out current enthusiasm to promote the mobility of blind persons, the beginning of the next century may see an incessantly mobile population of blind persons in a completely sedentary society. I offer this remark as one justification for a serious attempt to develop a theory of mobility, one which takes account of the needs of the populations involved in planning, and one which allows for a variety of these needs to be satisfied. The celebrated study by Lukoff and Whiteman at the Columbia School of Social Work has accustomed practitioners to the fact that only about one percent of the blind population currently uses guide dogs, and that perhaps two percent of that populations could potentially use them. What of the rest?

Not one of the mobility aids currently under development or evaluation--and there is none that has reached the stage of concensus among researchers as a fully practical aid--is designed to replace the cane or sighted guide or dog guide: most are best thought of as a supplement to these modes of travel. Re-

search in this area has fully as many complications as in the development of reading aids, and the computer is helping to reduce the experimental work load by permitting the simulation of operation of specific devices under laboratory conditions.

Among the devices showing promise is the Kay ultrasonic aid, now in its second serial production run which is capable of object identification and detection. It can also be used as an environmental sensor. Its output is very rich in information; and for those with the skill and sensitivity to use it, it seems to provide a great deal of evaluation. But both in the US and the United Kingdom, the results cannot be considered conclusive. Its most enthusiastic defenders will claim that it can be used for fully independent travel, and at least one agency in the United States has opted for training of all its clients with the aid. An interesting fact which has emerged from the evaluation trials in the United Kingdom is that the Kay aid proved to be a valuable training aid in teaching mobility in familiar environments; after a period of use, the aid was turned off, or its use was suspended entirely, and students seemed to move more confidently along training paths than they would have while being trained for an equivalent period with any other aid (Leonard and Carpenter, 1962; Russell, 1967).

Another ultrasonic aid showing promise is the Russel Path Sounder (Russell, 1967), which is designed to be used with the cane. The device gives early warning information about the area through which a person's head, shoulders, and upper body will pass along a travel path. Beyond six feet, the unit is silent; when an object is detected, within four separate and closer zones, the device emits a signal characteristic of that zone.

Another system is that developed by Biophysical Instruments in Bala, Cynwyd, Pennsylvania (Benham, 1967). It incorporates three laser like emitters and receivers, aimed at head height, straight ahead, and the area ahead of the cane tip. All three, with their associated circuitry, power supply, and both audible and tactile displays, are contained within a lightweight cane; the whole assembly weighs a pound or less, plus the normal weight of the cane. The device provides a wealth of searching capability for the user. Its usefulness to the user, both in the laboratory and in the field, will be unknown until evaluations of the unit are completed. It is hoped that the evaluation will begin this year.

The fourth of the most promising device systems is that developed at Stanford Research Institute (Gardiner and Bliss, 1967). Like the older Kallman passive optical probe, it depends on ambient light, rather than on emitting and receiving pulses back from the environment (Kallman, 1954). But the Stanford device uses an extremely advanced vibrating mirror and mask matching arrangement in which an object imaged by the lens system gives rise to a maximum voltage when it is in focus. This arrangement allows setting of the device for object detection at specific distances. The output is auditory or tactile.

A variation of the Stanford device is the Polish Electroftalm, still undergoing evaluation in principle at the Pomerainian Medical Institute (Starkiewicz and Kuliszewski, 1965). This device, which also uses a lens imaging system, detects the image on a photocell array, and stimulates a matched array of tactile stimulators installed in a head mounted band: the stimulators act on the forehead to give a tactile equivalent of the patterns of light and dark sensed by the photocell detector unit.

Folding Canes

A lightweight and folding version of the standard cane has been called for frequently. Prototypes of at least four well engineered versions of folding canes are now under evaluation, one from Canada, two from Israel, one from the U S.

The Center for Sensory Aids Evaluation and Development of MIT has decided to produce 100 of one version of these collapsible canes, and to distribute them for field trials beginning in Summer, 1968.

Cane Tips

The question of more attention to cane tips has been raised also from time to time. Aside from one early and unpublished study in 1962, of cane tip materials from the engineering point of view, there does not seem to be any serious effort devoted to this question. Most investigators seem to feel that the best use of present day materials is being made with the processes and fabrication methods now in use.

"Artificial Vision" by Phosphene Generation

Finally, I should mention the se of patterned phosphene generation for a possible mobility aid. Unpatterned phosphenes have been with us since one of our caveman ancestors hit a comrade over the head with a club. Armando del Campo in Mexico, has developed an "amaurscope" that, it is claimed, stimulates the experience of vision (1965). Phosphenes are the flashes of light seen when you press on your eyeballs; they also occur when the visual system is stimulated by electrical currents. It has been found possible to elicit these flashes of light by stimulating electrically the trigeminal nerves of the face. This finding has been used for a highly experimental mobility program by researchers at the Lawrence Radiation Laboratories in California (Budinger, 1968). An image on an array of photocells is used to generate voltages of differing amplitudes and phase, which are applied to the trigeminal nerve. It was found that the patterns generated could be more or less reliably associated with repetitive features of the scanned environment, using a population of students from a residential school for the blind.

Visual Prosthesis

This study will deal very briefly with the question of an actual visual prosthesis: a system of instrumentation which is designed to give a visual experience bearing some relationship to the world around us. Proposals to provide such a visual experience, now under serious consideration by neurophysiologists and instrumentation experts, usually consider the possibilities either of direct input to the brain of an electrical analogue of a scene scanned by some optical transducer, or of an electrical array coupled magnetically or electrically to the visual cortex, but placed outside of the skull. It is important, however, to understand what is meant by "a visual experience." Even the most optimistic and informed estimates of the successful achievement of such a goal assume time periods of ten years and fiscal support in billions of dollars; and the visual experience which such instrumentation would give is unlike anything a sighted person could understand from his own visual experience. Indeed, it is impossible to state now what the nature of this experience will be; it is rather easier to state what it is not, namely, anything which a sighted person understands by the term "seeing." Think of a very low grade black and white television transmission with poor resolution, and much uncertainty about whether an image exists at all; add to this a period of two or three years merely to learn to interpret what this poor image may convey of the world--and you will have an idea of the most optimistic forecast informed scientists have of the prospect of providing a visual prosthesis. Finally, that is for granted that the match of man and prosthetic system must be highly selective, highly individual, and under constant supervision; that in all likelihood there will be many unforeseen difficulties along the way to achieve even the visual experience described; and that a great many equally informed scientists agree that it is likely that these difficulties will never be solved.

I think it clear that the picture which emerges gives us a rather poor prospect for the possiblity that our knowledge is equal to the task we wish to

accomplish. What is most evident, indeed, is the pitiably small amount of knowledge we have of what actually goes on in the processing of signals in the visual cortex itself. No reasonable man can expect, therefore, that the problems of blindness and severe visual impairment are likely to be swept away by a deus ex machina.

Some listeners may believe that this description has been deliberately painted rather gloomily--that achievements in this field give one reason to believe that they represent a minimum expectation. No sober consideration of the evidence before us, including projections by informed researchers on the possibilities inherent in this line of research, however, can lead us to any other conclusion. It is abundantly clear from this evidence that we shall have to do our best to alleviate the deficits in the human experiences of blindness with the tools now available before us.

I expect that a forthcoming conference devoted to visual prosthesis research, to be held in New York City, will help to confirm this view. It may also help set aright the exaggerated expectations of many, based on enthusiastic but improbable inferences and projections from current trends in television techniques, advances in microminiaturization, and startling advances in our understanding of the physiology of vision. All these advances simply do not warrant the expectation that we are very much closer to artificial vision for all the blind now than at any time in the past.

II. Sensory Aids Research and Translation into Practice

Introduction

L. Armand (1968) of the French Academy quotes, in Realites, the comment made by L. Corbet, on the achievement represented by the launching of the Saturn V rocket last year, in which Corbet stressed the difference between a mere technical achievement and the confluence of many great technical achievements all at the same time, which in this case, made the launching an act of creativity. Corbet said, ". . .phenomena (thus) change their nature when they change their dimension."

I should like to make a distinction between two different kinds of technology, and show their relevance to the population of persons who would be affected by them. The distinction to be drawn is between the technology of the future, far and near, which is a "technology of the first estate," and which will be called "systems technology;" and a technology of the general purpose or special purpose everday type of aid, which is a "technology of the fourth estate," and which will be called "workaday technology," after the "Gebrauchsmusik" of Paul Hindemith. The purpose of making this distinction is modest: to emphasize that systems technology requires equipments and funding that go far beyond the capacity of the local, interested groups working with blind persons--and specifically far beyond the ability of teachers to use now in their classrooms. The workaday technology is already available (or about to be available) relatively cheaply, easily adaptable to special purposes, and with channels of distribution already in existence. There are borderline cases, of course, which no definition ever escapes.

For these distinctions to make much sense, however, they will have to be placed within a wider context; and it is at this point that I shall have to try and weave the strands I have deliberately left dangling in my previous remarks. The best approach would be to develop a full fledged model of the interaction found between the communities of research and of practice. This is, unfortunately, rather too ambitious a task for this study. I shall therefore take an alternative path: that of developing a series of descriptive remarks which hopefully will characterize each of these communities, and give some basis for understanding the kinds of interactions that take place between them.

To enhance understanding of this context, some figures on the population of children involved in the application of the two technologies to education will be included.

There are two points it would be valuable to keep in mind in this following discussion. First, the term "workaday technology" includes both typhlotechnology (that is, the applications of technology to solve the special purpose quotindinal problems of blind persons) and the application of general purpose technology (not developed for blind persons) to solve the quotindinal problems of blind persons. Second, "researchers" and "practitioners" will be discussed; "practitioners" referring to teachers of the blind & severly visually impaired.

The Community of the Researcher

The role and the activities of the researcher are governed by well known and generally accepted rules and conventions. The process of research has been described at length elsewhere (Graham and Clark, 1967). In general, the technologist strives to find solutions to problems which are common to groups of persons, the larger the groups the better. By doing so, he can reduce the cost of translation of a laboratory prototype to practice, and if he reduces costs far enough, he can also include more sophisticated solutions to the problem his technology solves. In his work, he is governed by the basic rule of scientific work, that science is public knowledge; thus he publishes the results of his work in sufficient detail that another equally competent investigator can achieve the same results he has achieved with the same means.

The constraints on the researcher or technologist are therefore:

1. That he strives to create a solution to a problem which has high specificity but also maximum generality

2. That his solution utilizes as much of the resources available in the nation as possible

3. That he proffer solutions which have applicability to the greatest possible number of people affected

4. That the cost of the solution represents what the users can afford, however paid for

5. That it represents an intellectual product acceptable to his peers

6. That his solution can be used within the social and psychological community of the ultimate users

7. That it represents an effort which can be accommodated within the division of labor extant in his own community of fellows

8. That it meets a need recognized clearly enough by the practitioner that he will find acceptance of what he proffers.

Technology is commonly regarded in terms of the devices or techniques by which human capability is extended. In this sense, the communication problems of the blind and severely visually impaired have exerted considerable fascination for technologists; as witness, we can note the development of the typewriter, the fountain pen, the ball point pen, the dictaphone, the phonograph, and the long playing disc. Yet it remains true that a thorough and realistic evaluation of the needs and capabilities of the aged, the student, the young adult, the congenitally blind, and the multiple impaired would show that the goals of the communication function are different for each of them, and therefore that the optimum technologies useful in the achievement of a goal of maximum human func-

tioning for each of these subgroups may well turn out to be different.

The developments in both basic and applied research and development are difficult to initiate and sustain--and they require persistent and sustained efforts. Their selection, development, and evaluation are all dependent on prior value judgments made about the population to be served, the money to be invested in them, and the time and effort required, by whom, and for what persons affected. This implies, in turn, that we recognize that value judgments can be made either explicitly or, by default, implicitly (through disregard of research, lack of support of research, or failure to translate research into practice). To make these important decisions, we must know what needs research can meet.

The Community of the Practitioner

Scott (1967) has already indicated that the sources for the current organization of work for the blind stem from the beginning of the present century, when children who were blind, and the industrially blinded, were the two major groups in this population. It is important to point out also that the sources of education for blind children, in the goals of the educational system, in the organization of the teachers, and in the venue of education, were also determined by those facts. It is also true, as Scott notes, that turn of the century solutions to turn of the century problems are still being applied today with the blend. The organization of Special Education has not accommodated itself to changes in the population with the totally blind child, or the child with light perception only, for these were the children blinded at birth by opthalmia neonatorum: this was the population of blind children with which educators were faced at the beginning. Add to this the fervent atmosphere of social reform, a missionary zeal to provide access to the Scriptures, a Victorian atmosphere of morality and asexuality, and a pervading protectiveness toward the afflicted child--and one begins to appreciate the conditions under which the special concerns of educating blind children arose.

The special difficulties of communication, and the lengthy time required to teach the totally blind child a tactile code, resulted in an isolation equally complete between the child and his sighted peers, and between the teacher of the blind and the teacher of the sighted. Indeed, separate institutions for the blind were the rule not the exception. The dominant theme was that of limitation, not capability, and any success in overcoming these limitations was celebrated and rewarded. It was perhaps inevitable that a special corps of teachers developed also a community of interest separate from the rest of the educational community.

The Population to be Served

That this separation from the mainstream of educational life is a persistent phenomenon which has long outlived its usefulness is shown by available figures, first on the comparative rarity of blindness today, second on the levels of acuity which exist even within the economic definition of blindness (Scott, personal communications, 1968).

Table 1

The Comparative Rarity of Blindness Among Children

Age	Rate (per 1,000 persons)
0-21	0.35

18-24	2.9
25-34	2.6
35-44	2.3
45-54	6.7
55-64	12.0
65-74	28.0
70-79	33.0

The levels of acuity which exist among the population of children regarded as blind can only be guessed at, but we are fairly sure that no more than ten percent of the total school age population of blind persons is totally blind or has light perception only. Consider the implications of these facts; they mean that the organization of education for blind children, if unregulated, will impose the standards for educating children developed for blind children at the turn of the century on the entire population of those with levels of visual acuity under 20/200! On the one hand, we are dealing with a relatively small population of persons; on the other hand, that population is composed of those representing various levels of visual acuity, the bulk of which represents some useful vision. There is, perhaps, little reason to wonder why special educators are not prepared for peak periods of occurance of blind children (like the RLF children), why they have not consciously adapted to levels of acuity below 20/200 (but above total blindness) , or why they are not prepared to accommodate the wide variety of levels of remaining vision.

There is a further consequence of these figures that should be kept in mind: the rules applying to the application of systems technology do not necessarily apply to the application of workaday technology. For one thing, the benefits of the first may be universal, in the sense that developments aimed toward problems of the blind have a much wider applicability, with some variations of hardware involved; for another, they are often anticipatory of great social and technical changes in the society. The comparative rarity of blindness among children means, among other things, that the likelihood of the development of systems technology to meet their special problems, with technological solutions with high specificity, but low generality, is not likely to occur. This suggests that educators of blind children must look to the workaday technology to aid them, and we shall suggest how some of these developments might be utilized. We also know that at least some of the problems of blindness are unique.

What the Practitioner can Do

To summarize, we have, on the one hand, a group of researchers and technologists motivated by their perception of solutions to the problems faced by blind persons to see the possibility of application of the products of research and technology to these problems. There is a limit to the applicability of this technology, and to pass beyond it requires long range substantial funding and special competences; moreover the work is conducted within the "rules of the road" for the research process. On the other hand, we have an educational community which deals with a population only ten percent of which is prepared for the content and conduct of the methods used, by virtue of its characteristic impairment, to allow functioning in a sighted community. Indeed, the organization and conduct of the education received by this population is in general isolated from even the general educational community; there is an insistence on the individual uniqueness of each student; and the educational system is not generally equipped with means of communication with the agents of innovation the world of research. Yet there is a growing awareness of a feeling of dissatisfaction with this state of affairs, an awareness that the problems of the special educator are increasing with the growth in the population of economically defined blind children (a natural consequence of the

overall population growth, and the lowering of the infant mortality rate), an awareness that the traditional methods of educating the totally lind are not suited to the majority of students educated in these programs and in these institutions. What can be done?

There appear to be two ways in which change might be effected. The first involves the maximum utilization of workaday technology in dealing with the problems of "blind" students. The second involves the creation of an attitude of experimentation and innovation within special education which will open channels of communication between educators and technologists, between researchers and practitioners. Following are some suggestions for application of current knowledge, and for generating more precise knowledge, in some of the areas of development, under the headings already used in describing the state of the art. This is not intended as an exhaustive discussion of the exciting possibilities open for exploration by the adventurous, but is intended to give some idea of what can be done.

Reading and the Use of Large Print

It is often only in the school setting that trouble with vision becomes apparent. But with the development of cheap and simple vision screening techniques, it is possible to think in terms of vision screening as a routine part of the school health evaluation program. The early detection and treatment of eye trouble (e.g. amblyopia) would go far toward preventing the growth of vision problems.

We know very little about the optimum use of residual vision. In increasing our knowledge of the capabilities of children to use remaining vision, the classroom teacher can be an invaluable aid. Indeed, our best knowledge of the optimal use of perimacular vision comes from the remarkable work of a classroom teacher of rare gifts, Miss Katie Siebart, in California.

It is certain that, if sufficient demand were created for it, it would be possible to generate large amounts of large type cheaply and quickly. The method is simply to take the compositor's punched paper tapes used in the printing industry to set type, and arrange for reading it into a computer with a high speed printer output and large type font. Compared to some other systems technological developments, this would be a relatively trivial problem. Whether or not the demand will arise depends in great measure on the perception by teachers of the use for the product. We can only advise, not coerce; the rest is up to educators.

If only ten percent of the total population of school children can be considered totally blind, then a combination of training in visual efficiency and the use of large print type appears to be an attractive possibility for providing direct access to the printed page. Consider that, of the number of blind children registered in school (about 20,000), the number of totally blind is about 2000; the number of multiply impaired somewhere between 500 and 1000; and the number probably having some useful vision about 10,000 to 12,000 (Goldstein, in press; Dauwalder, 1964). Since IQ is probably normally distributed among this group, and since braille proficiency is limited to those having IQ's above about 85, the number likely to benefit most from braille reading is likely to be about the same as those who are multiply impaired (Graham, in press).

Mobility

The potentialities for increasing the capability of children to move about in their environment is greatly increased with the provision of mobility training. Note that at present there is no provision for mobility instruction between elementary school and high school on a general scale; only experimental programs have been mounted so far. Moreover, present programs are hampered

by insufficient funding and staffing. Possibly many teachers are not aware that some effort has been devoted to a readiness test for mobility training, which needs their further use and criticism (Graham, 1965). There is also a large gap between the need for mobility instructors and current plans for providing instructors; especially if this training is extended to all of the school population which can use it, then previous estimates of the need for mobility instructors are grossly inadequate (Schon, 1967). Also, the potentialities for training in navigation are enhanced by some of the electronic aids just beginning to become available, and whether or not they prove to be useful mobility aids--in this there is a question--there is little question that as training aids they may play an important role (Schon, 1967).

Compressed and Speeded Speech

Since so much of the world of the visually impaired is auditory in nature, considerable interest has been generated among teachers by recent developments in time compressed speech. One reason that interest has been stirred is the fact that these techniques are technologically sophisticated and elegant; their major disadvantage is that they depend on rather exotic machinery. Many teachers are not aware of the possibilities for more rapid communication with speeded speech, that is, the speech resulting from playing back tapes or discs at speed higher than the recording speed. Yet, there is a potential saving of one-third in the reading time of students, and as John Dupresspointed out, the point at which comprehensibility of both speeded speech and compressed begins to decline is about the same(Dupress, 1966). However, the cost of producing speeded speech is far less than the cost of producing time compressed speech, and the population likely to find this method useful comprises about 10,000 high school and college students. Evidently what is required is some aid in learning to listen, which is not a passive activity. How many students would now be prepared to benefit from increased rates of presentation, even were this generally available? The motivation to attend to the auditory cues available, and learning to listen with increased rates of presentation are both matters now open for investigation at every level. One of the most important factors we have to keep in mind is Dupress' (1966) insistence on a followup of students after the training program is over to see if they continue to use a learned technique or aid, or if the use of what has been taught decreases after the end of the training program.

Research so far reported using time compression techniques gives one some reason to urge further trails of the technique in the classroom. The promise held out by the use of time expansion of recorded speech (for the mentally retarded, for example) is also interesting: some recent results indicate that expansion may allow for the smaller immediate memory store of which these children are capable, and also for their decreased perceptualabilities and decreased ability to order input stimuli sequentially, as compared to normal children. But it is somewhat discouraging to report that compression of speech seems to leave them as far behind their normal peers as when speech is presented at normal rates. Furthermore, the Newsletter of the Center for Rate Controlled Recording reports a trial course in American History at the Hadley School, in Winnetka, Illinois (in both compressed and noncompressed versions) that indicated that students using the compressed version did not achieve grades which were very impressive, although they did somewhat better than those not using the compressed version of the course.

In discussions of the use of compressed materials, the matter of learning to listen is mentioned over and over. Perhaps it might be possible to think of learning to listen in the same way I have suggested that teachers try using electronic devices for mobility: that is, the use of learning to listen, whether by use of special devices or not, may be far more important than the

fact that we have one or another device which permits compression of speech. An emphasis on this aspect of learning, now generally neglected in education, may afford one of the important points of contact between special and general education of children, and bring trials of compressed speech with blind children into the arena of general educational research on learning to listen.

In any case, it is clear that our understanding of what actually occurs in the compression of speech is just beginning to be extended. The limitations of the most widely available device for compression of speech (the Eltro Information Rate Changer) should not constrain us in our attempts to find even better ways to use time compression for better transfer of information in the auditory channel. For example, we have far from exhausted the utilization of style of speech to optimize compression by computer processing of the signal, and we know that dichotic listening may preserve the natural redundancies of speech, while altering their composition in the natural speech signal, thus increasing recognition rate while preserving comprehension. Furthermore, research on the transfer of information may depend auditorily on the results of research on the processes involved in our comprehension of auditory signals in general. We think now that when the channel capacity of audition is exceeded, some of the input cannot be extracted at the output, as is included from the Hadley School study. Much evidently depends on the extent to which we can pare away the successive layers of redundancy in the normally appreceived auditory signal, as has been described in the general literature by G.A. Miller and others, and still have enough left to recover the irreducible information content of the message. Certainly the results of Wietse's work with time compressed speech on visually impaired children reported in The Center for Rate Controlled Reporting Newsletter implies that more than the central processing involved determines the success or failure of a teaching program using such material (although central processes may well bound a limit to compression). Finally, our ability to use alternative devices to create compressed material ultimately depends on the extent to which out basic knowledge of central cognitive processes grows: enough evidence has been accumulating in the past few years to suggest some general model for the processing of visual, tactile, and auditory signals; the successful development of such a model would give us important insights into alternative methods of generating compressed materials.

One immediate consequence of the currently available devices to create compressed speech could be the increase in demand by teachers for samples with which to train students in learning to listen; and in opening the classroom for experimental investigation of the usefulness of compressed material for the blind, the severely visually impaired, the visually impaired--and for the sighted student, too. One of Foulke's studies indicated that there is no interaction between word rate for listeners and the reader's voice quality and reading style; evidently the factors making for comprehension at accelerated word rates are the same as those governing comprehension at normal work rates. (Foulke and Sticht, 1967). An additional reason for learning to listen is indicated if the desire is to optimize the use of compressed speech materials.

The Use of Currently Available General Purpose Equipment

I have suggested above that there are two ways in which change in the difficulty of translation of technology into practice might be affected: through the maximum utilization of workaday technology, and through the development of an attitude of experimentation and innovation. There is no better illustration of the payoff in the fulfilling of both these aims than in some recent attempts to bring home the already present materials that teachers can use here and now. I should like to report to you the result of one such experiment. One researcher became convinced that, in fact, many teachers of blind and severely visually impaired children were isolated from the mainstream of developments in the general educational field, to the extent that they were simply not aware of the aids that manufacturers made, which had immediate relevance to the classroom situations they faced. The resear-

cher had no resources for purchase of a variety of educational materials; but he cajoled distributors into letting him have materials for a period of a few days, and he placed the materials in one large room. He then secured the help of a small group of children, and their teacher, to demonstrate and to play with the materials. The demonstration was not publicized; no notices of it were printed; but by work of mouth, and after the first morning of a two day schedule, he found himself overwhelmed by the response, so much so that he had to extend the demonstration another two days. The response was not only from the school in which the demonstration was held (although that was enthusiastic enough), but by word of mouth the news was spready to the community school system, and then to a neighboring school system, and the teachers came in numbers to see the materials about which so much excitement had been generated.

What were some of the materials? Among them were products from Electronic Futures, Inc., including a card with a magnetic stripe along one side, on which large type or braille could be imprinted; a 21 track, self contained, tape recorder with controls that are easy to operate even for persons with one hand, rugged and well constructed, from the same manufacturer; disc player made by Audiotranics, in California, that can rotate at full speed backwards for indexing purposes; variety of recordings of everyday sounds from commercial record producers; some courses in training for listening: one, produced by Mc-Graw Hill, was made for salesmen, and uses time compressed speech; a course in learning braille, produced by Electronic Futures, Inc; variety of large print books from a number of manufacturers, along with samples of large print produced by the ITEK plate maker, and a xerox 914 copier. Ther was also a wide variety of tactual displays, including holding boards with flannel or magnetic backings, allowing the construction of letter displays and tactual maps; therewas even a special paper which, when heated, produced raised lines for tactual appreciation of outlines.

Some surprises turned up during the few days this equipment was demonstrated. For example, both teachers and pupils were somtimes startled at the way in which children were able to operate controls of machines quite well, even when it had been thought they were not capable of doing so; the inference is that the human engineering of some commercial products, at least, is better than had been thought. Another example: teachers found that even a two times enlargement of ink print type made text available to a far larger number of children having limited ability to read than they had thought, that the four times enlargement of other commercial materials was even better, and that they were surprised at how much was available from the educational supply houses.

One real surprise was that the IBM Model D typewriter on display, released this June, found far larger numbers of users than anyone would have suspected. Although no special attention was paid to the unit, it seemed to fascinate children, who quickly learned to make the association between a particular key and a particular braille configuration; furthermore sighted staff members of the school where the machine was on display found themselves by passing the overworked braille transcriber, and writing notes to braille reading collegues and students directly, even with letter by letter transciption if they knew no braille coding.

The overall impression of the researcher, who had to close his doors forcibly and return the equipment he had on loan, was that the knowledge of the availability of these materials, among others, encouraged so much on the spot ingenuity in applications among the teachers exposed to the equipment that they found themselves excited by the prospects of innumerable applications to the classroom they had never envisaged before. His exhortation is that, very simply put, the field of special education should look to the commerical houses for the equipment and materials they have available, use a little imagination, and find solutions to the many problems teachers say they face for lack of special purpose equipment now. His exhortation assumes a special importance when we remember the distribution of the levels of visual acuity among the school age population I have mentioned above;

there are obviously many children who could use equipment meant for the normally sighted who are the poorer for the lack of the stimulation they provide.

More importantly, however, I think it is imperative that some means be found to break the wall of isolation around the special educator. That wall was created by conditions which no longer prevail. If the change in the population of school age children who have some vision obtains as is described here, there are many children being educated as blind students who are in reality more sighted than blind (except in the economic or administrative meaning of the term). Perhaps what is needed is a mobile trailer, full of the educational materials and products such as those mentioned here, roving around the country, stopping where there are special educators and children in classes for the blind, and encouraging the exploration by teacher and students alike of the opportunities for overcoming the limitations of no special equipment for them.

I am aware, of course, of the program of the instructional materials centers just beginning to be established and to have some influence in the nation; and I should not like to diminish their importance nor their usefulness over the long term. Nevertheless, there is no substitute for bringing currently available technology and the products of technology to the classroom teacher in her own surroundings.

There is one more matter concerning relations among the classroom teacher, the administrator/educator, and the researcher that should be mentioned before leaving the topic. This has to do with the level from which facts about teaching of children is drawn to feed into the theory of the researcher. What is involved is the fact that to the researcher, "practitioner" means a person working at the "lower range" of hypotheses (to paraphrase Robert Merton); in the field, however, a "practitioner" is more often than not an administrator who is highly verbal, not presently teaching or working directly with children, or who is concerned with the implications of action programs on the community, state, or national levels.

Thus a researcher who is working at a "higher range" of hypotheses, i.e., at higher levels of abstraction from reality, needs the most basic, grass roots, information about how, why, what, when, and who, and is he is not likely to obtain this kind of information from administrative practitioners who deal commonly in categories or persons who act under a certain limited set of circumstances, under certain kinds of environments, and with certain kinds of grass roots practitioners (the classroom teachers). In other words, the researcher can obtain from the administrative practitioners only a preprocessed version of the reality he seeks to examine.

Since a researcher's theory, at a high level of abstraction, can only be tested so far as it can deal with as concrete a reality as possible, this means that high level theory is, more often than not, never tested against concrete reality, but only against an administrator's view of reality, with all the flaws that this entails. The interaction between the two is further compounded by the fact that the best grass roots practitioners are often teachers (and workers for the blind) who are not good at communicating what they do, although they communicate superbly with students or clients. Finally, those few persons who turn out to be exceptions to the rule, and are communicative with colleagues, do not deal at the grass roots level for very long: they are coopted by the administrative structure in short order.

Since all these factors may represent constants in the interaction between researchers and practitioners, they are often ignored, and greater or lesser violence to the results of research is the consequence. An attempt should be made to face the possibility, however, that the constant value of these factors in the interation equation between researchers and practitioners may acquire different weightings depending on the population studied, the personalities of the actors,

the nature of the research design, and the intended use of the observations obtained. For this reason, I consider them crucial variables in any research design.

Conclusion

This paper has atempted to give a rather rapid fire survey of attempted being made by researchers and technologists to deal with two of the major concerns associated with blindness and severe visual impairment: navigation and mobility, and direct access to the printed page. There are a few general features or distinctions of these several attempts that may help to organize thinking about these complex and many sided activities; as it happens, these features help to shape these activities into a few broad categories of effort.

The most important distinction is between systems technology and what I have called Gebrauchstechnologie or workaday technology, both special and applied.

The second distinction is between the community of researchers and the community of practitioners, and the associated norms which obtain in them, the activities carried on within them, and the lines of communication they have.

The third distinction is that obtaining in the administration definitions of blindness and severe visual impairment, definitions meant for the totally blind, which impose on our thinking techniques and methods and are inaccurately applied to students who may actually have some vision which can be used and trained for greater visual efficiency.

The fourth distinction is the result of examination of the demography of the blind and severely visually impaired population, and the realization as a result that blindness, even as administratively defined, is a relative rarity.

When these several factors are combined in clusters of factors which influence the course of research and development in the field of sensory aids, several important consequences follow. Prominent among these is that systems technology requires a large national effort to be mounted for successful delivery of its potency in useful products; the creation of a sustained effort for evaluation and training in the use of these products, and an engagement of the practitioner or teacher very early in the evaluative process.

Another consequence is that systems technology will not often prove to solve most of the problems faced by the teacher in the classroom day today: these are too varied and too special from child to child to make this possible. It is here that we can expect the greatest impact of workaday technology, and most especially from the direct utilization of currently available educational products and techniques developed for whatever purpose.

Finally, it is evident that if the opportunity is provided for the teacher herself, and her students, to create the sense of a classroom laboratory, a number of benefits may be realized. Among them is a fuller utilization of the capabilities of the individual student, a greater sense of accomplishment in the teacher, and the creation of a pathway for interest in the delivery of both technologies to the classroom.

The present state of our knowledge of sensory aids, at least on the level of workaday technology, permits us to see the almost immediate creation of an environment for the visually impaired child which offers him a wide variety of alternatives in his attempts to engage himself with the world around him. With relatively little effort, a realistic possibility exists to turn his learning environment into an exciting adventure in exercising his talents and allowing him a scope and depth of interaction which encourages him to explore and experiment.

The creation of a "creativity amplifier" out of the surroundings of the schoolroom has the possibility of making possible the creation of a "hearing feeling" space patterned after the "seeing hearing" space of the normally sighted child. Coupled with the possibility that this kind of innovation may help make possible the swifter delivery of systems technology to the classroom, the prospects for a richer experience for both the child and his teacher seem attractive indeed. The fact of an impairment cannot be changed; but the prospects for alleviating the consequences of visual impairment in children are steadily improving. What will you make of these prospects? Since a researcher can only advise, and cajole, and entice, but not coerce, your answer is awaited with great interest.

(Copies of the original paper, from which this condensed article was taken, are available from the author, Leslie L. Clark, Director, International Research Information Service, American Foundation for the Blind, 15 West 16th Street, New York, New York 10011)

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